



# Chelmsford Amateur Radio Society

## Newsletter

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**Next meeting: 5th July - 7.30pm, Oaklands Museum**

**Antennas - by Justin Johnson, G0KSC**

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**Club Nets - Tuesdays 20:00h**  
**Net Controller: TBD**

#2 - GB3DA 12th July  
 #3 - GB3ER 19th July  
 #4 - 80m 26th July  
 3.756MHz  
 #5 - 160m n/a  
 1.947MHz

**Essex Ham Net**  
**Mondays 20:00h GB3DA**

Bent element enhancements  
 in Yagi antennas



The why and the wherefore  
 explained and discussed  
 by Justin

Contact details for the newsletter: [editor@g0mwt.org.uk](mailto:editor@g0mwt.org.uk)

## Editorial

Hello again, and welcome to the latest edition of this newsletter. As usual, as I sit and start this issue I have no idea where it is going to go, but there is plenty of material to tap already. I should start by apologising to Mike G4NVT for getting his callsign wrong. I should have checked, but I didn't. Must try harder!

I was contacted by a Cathy Santos who found the CARS website had a broken link (now deleted). She found our site whilst looking for drone related ones and she runs her own: <http://www.droneybee.com/> It is quite interesting and informative on the subject of all things rotor borne.

The upcoming talk by Justin, G0KSC promises to be interesting, with a huge agenda all centred around the notion of bent elements – that is by design of course. Subjects will include S/N ratios, the reason for bent elements, matching, modelling, enhancements, advantages and lots more besides.

Talking of lots, the latest edition of CARS News was a nice read, with lots of info about the various field days being attended by members. They always have a good mix of articles, so how about writing some for this Newsletter?

## Ofcom online licensing changes



At Murray, G6JYB's request I am including important information from the RSGB's affiliated clubs newsletter: *"Ofcom is changing the online licensing systems that support amateur radio. The change is part of a wider initiative to upgrade its licensing systems and extend the range of Wireless Telegraphy Act licences that can be applied for and managed online. For amateurs, new facilities will include the ability for Clubs to apply for the first time online. The changes will be phased in, with the new system going live in early summer. New features will then be introduced in the following months."*

*All existing licences will automatically transfer to the new system, which will continue to be accessed in the normal way through OfCom's website. When first logging on to the new system you will be asked to create a new online account that can be used for all the licences you hold with OfCom. This process will be automatically initiated the first time you log in to the new system.*

*Ofcom is doing all it can to minimise any disruption caused by the change. But as is the nature of these things the change is likely to be a busy period for the team at Ofcom and your patience and understanding during the change-over would be greatly appreciated. Ofcom would also welcome feedback on the system once live so it can improve the new system, and a facility will be provided to collect this. More information on the change can be found at <http://licensing.ofcom.org.uk>".*

**Ed.**

## Dates for your diary

*Please note, the dates may be subject to change...*

Tue. 5th July	Meeting - "Innovantennas" - Justin Johnson G0KSC
Mon. 18th July	Skills Night - Danbury Village Hall
Tue. 2nd August	Meeting - "Constructors Competition" - Carl G3PEM
6th/7th August	Sandford Mill BIG Weekend! An interactive historical extravaganza!
Mon. 15th August	Skills Night - Danbury Village Hall
Tue. 6th September	Meeting - "Millimetric Microwaves" - Chris Whitmarsh G0FDZ
Mon. 19th September	Skills Night - Danbury Village Hall
Tue. 4th October	Meeting CARS Annual General Meeting
Mon. 17th October	Skills Night - Danbury Village Hall
Sun. October 23rd	Science Discovery Day at Sandford Mill
Tue. 1st November	Meeting - 25 minute chats (not 25 @ 1min each...)
Tue. 6th December	Meeting - Christmas Social Evening

## John (Jack) Brazzill, G3WP Silent Key

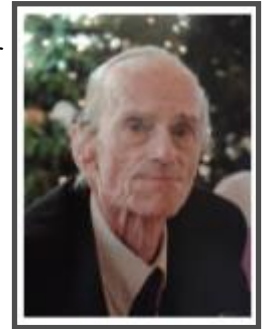
CARS was informed by Mark Sanderson M0IEO, Hon Secretary of Thames Amateur Radio Group that Jack Brazzill had become silent key.

John (Jack) was a volunteer QSL bureau sub manager for over 50 years and only retired from the post around three years ago at the age of 95, a remarkable achievement by any standard. John was also awarded a certificate of merit by RNARS for his long support and Sunday CW net control work.

John's funeral was held on Monday 20th June at 13:00hrs in the small chapel of the Crematorium in Chelmsford.

Murray, G6JYB has added Mark's obituary to the club website:

[http://g0mwt.org.uk/society/sk-services/John-\(Jack\)-Brazzill-G3WP.pdf](http://g0mwt.org.uk/society/sk-services/John-(Jack)-Brazzill-G3WP.pdf)



Peter Chadwick, G3RZP wrote in to John, G8DET to say:

*Jack was the first Chelmsford amateur I ever met in 1964. He was almost a fixture as a tester in TV test at New Street, and yet one of his pet hates (as is mine!) was broadcast TV - and another section leader in New Street!*

*I think I only ever worked him (CW of course) twice in my amateur career, but he had a great heart albeit a small and wiry body - I wish I could keep my weight down as he did in the 1960s! RIP Jack.....*

*Peter E. Chadwick, G3RZP*

Patrick Xavier, MW0XAP had this to say:

*I recall Jack, and saw the huge box of QSL cards he was sorting out; he told me of the sometimes amusing, sometimes annoying matters he'd had to deal with.*

*He had advertised an FT101ZD, having replaced it with a more modern transceiver. I'd wanted a backup set; it still works.*

*The Denco company that had employed him made a range of coils well known to amateurs.*

*I think he was active mainly on CW owing, I suspect, to deafness.*

*Rest in peace.*

*Patrick, MW0XAP.*

John, G8DET also says that in the early years, Jack was a friend of Roy Martyr, past CARS President, also now SK.

## Personal reflections

I didn't know any of the recent Silent Keys that were related to CARS except for Clive, G1EUC. After I got back into AR though, and re-established contact with the wireless world in Sussex, I was glad to talk to two of whom I had the pleasure of working with before their passing; Tony, G3NPF and Derek, G3GRO. Neither of them were local to Chelmsford (I'm the new boy here) but Derek, who was latterly President of Crawley ARC was pretty much instrumental in getting me a break in the Avionics department at MEL in Crawley. I worked for him for some years and he was a big influence on me and my development. I'll also always remember Tony auctioning the cr@p off at Horsham ARC junk sales. Great fun!

Neither Tony nor Derek were in good health in their later years. Tony had suffered long-term heart problems and Derek had the misfortune to suffer the consequences of an infection picked up in hospital after a routine knee replacement operation. He had to have his leg amputated but, nevertheless, operated from his hospital bed and whilst doing so, he was the first to contact my brother Dominic, M0GUZ when he got his licence. Derek taught me a lot and I am grateful to him for that knowledge and his friendship.

It is important to get out of life what you can, while you can. **Ed.**

## Talk by Fred Lloyd - the founder of QRZ.com

You will already have received this notification, but it is now updated:

In July, by special invitation, Fred Lloyd is coming to London to give a talk on why and how he founded QRZ.com. By invitation only as seating will be limited, you and your club are invited to attend the talk.

The talk will be on **Friday 15th July** and will start at 7:30 and will be for about 1 hour with perhaps 30 minutes of discussion afterwards.

It will be held at Springhouse Rd, Corringham, Stanford-le-Hope SS17 7QT. For the venue and details contact Colin, G0TRM on 01245 223835 or [g0trm@g0mwt.org.uk](mailto:g0trm@g0mwt.org.uk)

If you or any of your members wish to attend then please mail me back with a number of possibles and we shall try to make the seating available.

Remember this is a one time only gathering of like minded hams and Fred also wishes to speak to individuals to take notes to comment on his QRZ page. These will be exclusive interviews published on the front page of QRZ and this should generate great publicity for you and your club.

Best 73's and hope to hear from you soon.

De **Spencer Tomlinson, M0STO**

Chairman - Havering and District Amateur Radio Club.

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## August Constructor's Contest



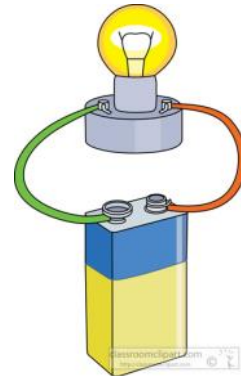
Next month sees the return of the annual constructor's contest, so better get out those unfinished projects and finish them off at last!

Failing that, get out the ones from n years ago, give them a wipe down with an oily rag and hope that nobody notices it's going round the block again. Vintage is good; look at the interest in the Marconi stuff at Hall Street recently.

Let's have a good turnout and don't forget that (almost) anything goes as long as it's electronic, (vaguely) relevant and, above all, safe.

The judges are looking forward to your submissions and awarding those prizes!

Go on—you know you want to! - **Ed.**



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## Radio Amateur of the Year

It's just after mid-summer as I write this, but nearing the time of year when we need to think again about who has done most for the club.

Please consider who you would like to nominate for amateur of the year and let Chris, G0IPU have your nominations by September 13th at the latest, so the Committee can deliberate and get the award engraved. If you already have a feeling who that would like to be, don't wait and let it get forgotten.

Pull on Chris's coat-tails at the next couple of meetings, earhole or otherwise accost him in person. Failing that, email on [g0ipu@g0mwt.org.uk](mailto:g0ipu@g0mwt.org.uk). The accolade will be presented at the AGM on October 4th.

Without your nominations, it won't be very democratic (but then again, there have been a few democratic decisions taken recently at National level, haven't there? - **Ed.**)



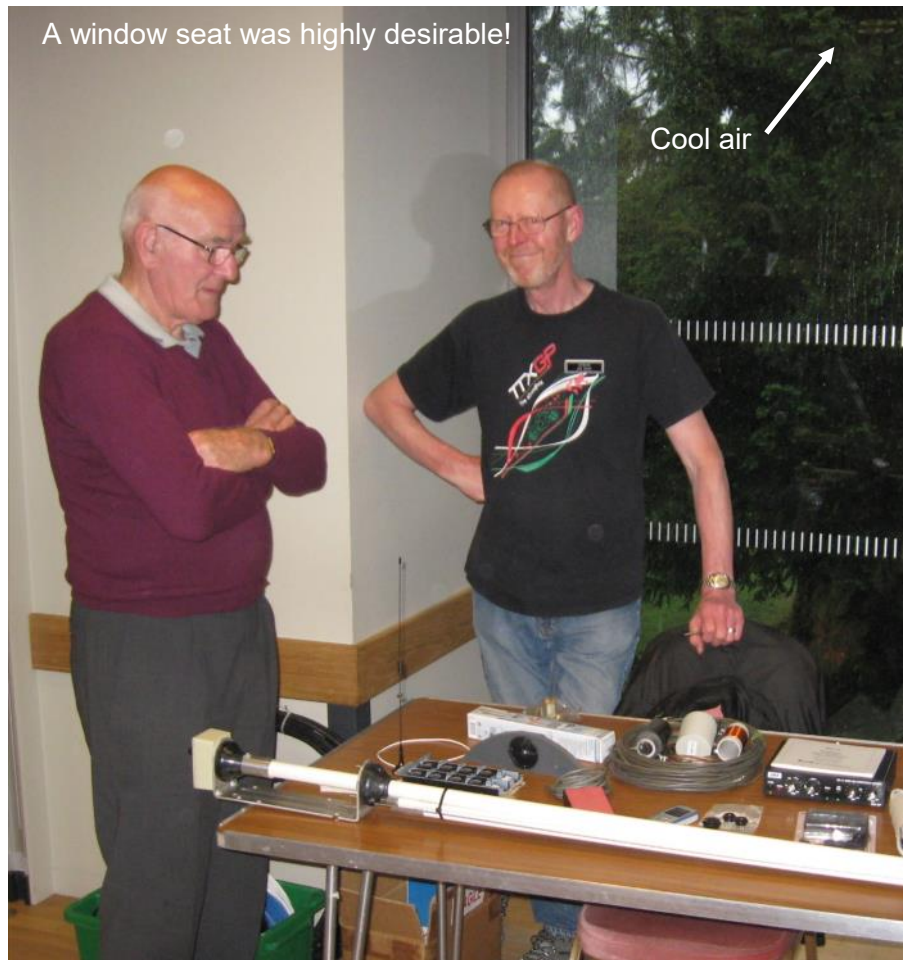
## Tabletop Sale

The annual table top sale proved to be the usual mix of the desirable and derisible, with a range of items from pretty much all walks of life.

I'm surprised no one got drowned as the weather was pretty dreadful that day. John, G8DET reported that it was about 22°C on his arrival and (I think) about 14°C when he left. The cooling effect of the rain can be quite dramatic as I can recall from my motorcycling days. There seems to have been a bit of a pattern to the rain recently—warm, muggy days and heavy showers in the evening. Temperature averages are still not what they should be for this time of year at all. Every year now, Mara and I remark on “Flaming June”; not for the quality of Frederik Leighton’s painting, but more as a ironic micro-idiom.

The weather, like sunspots and nostalgia, ain't what it used to be...

**Ed.**



A window seat was highly desirable!

Cool air



Just one raffle ticket? Why not the whole lot?



Bargains, boxes, bits & Bob's.

## DIY duffer

You know how it is. You need to do a job and there is no-one around to give you a hand. I was fed up with scrabbling around in an untidy tool drawer and wanted them to be accessible, so I thought I'd put up a wallboard to fix my hand tools on.

I needed to hold a redundant 1.2m melamine board against the wall with one hand, level it and spot through the fixing holes, but the wall was slightly proud near the board centre and the board, being shiny, was not stable. As soon as I moved my free hand, the board moved in sympathy. I needed something to hold the board in place to stop it skidding. Aha! Four small blobs of Blu-Tak. All it had to do was provide enough friction to keep the board still whilst I took the weight and spotted the screw-holes.

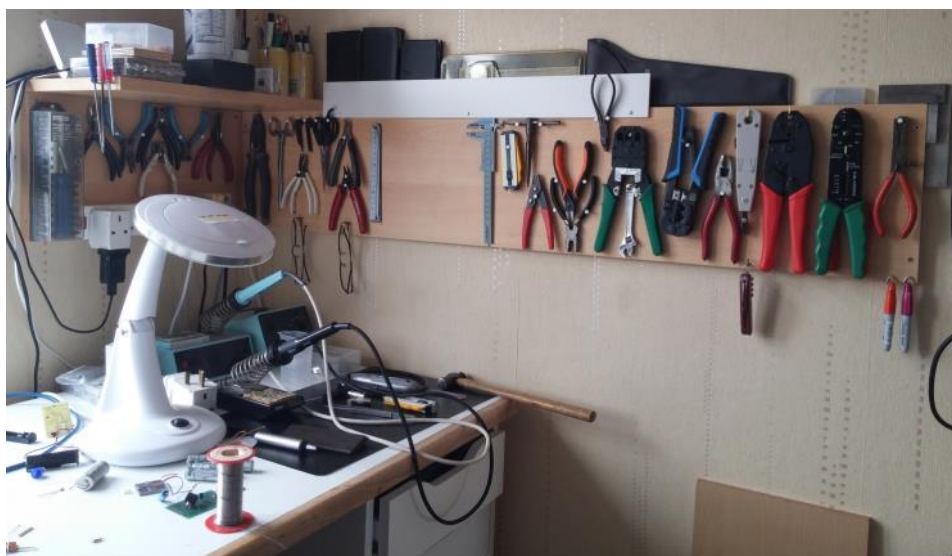


That worked very well. Hole positions marked, tools and spirit level set down, I just needed to lift the board away from the wall.

And then the wallpaper came off.

Never mind. It's behind the shelf and there are more holes in the shack than a colander so if I outlive it, it'll need redecorating anyway.

- Ed.



## LIGO

My mind wanders; it goes off sometimes and doesn't tell me where it's going. We all know how digital methods have improved the effective S/N in communications systems and that signals can easily be received that are well below the noise. I was listening to a program recently about the LIGO detector (Laser Interferometer Gravitational-Wave Observatory). Like proverbial London buses, you get nothing for ages and then two gravity wave events come along at once - December 26th 2015 and June 15th this year.

The interferometer's arms are 4km long and contain mirrors that reflect each beam 280 times, making the distance travelled by each beam 1120km in length. Nothing spectacular so far? Then you realise that 750kW of laser power is needed. You can't do that directly, so the beam is effectively recycled by shining it through a one-way mirror and redirecting it to be re-introduced with the original beam. This eventually increases the power 3750 times to provide the required effective power. When the beams are superimposed, the interference pattern is sharpened and then it becomes apparent an event has been detected.

All normal seismic, thermal, electronic and other natural and man-made noises have to be isolated, filtered out and sifted through for wanted signals. The housings are mounted in vacuum to reduce noise transmission and multiple advanced isolation systems are employed to reduce movement to about  $10^{-13}$ m. The mirrors, suspended on 0.4mm glass fibres reduce wanted vibrations another six orders of magnitude to about *1 millionth the diameter of an atom* or about  $10^{-19}$ m and the feedback/control loop operates at 16.384kHz.

That is quite some signal processing feat! - Ed.



## GB1JSS - June Summer Solstice on Galleywood Common

Well, not quite, but, even if it had been arranged for the 20th, the weather wouldn't have been good enough for the event which was held on the 21st. Your scribe had long overdue garden work to attend to or it would have been a good to have had a go. The TS570D on the car battery, remote ATU and a long wire to some trees; it may well have worked. Maybe next year? - **Ed.**



Charlie, M0PZT set out his inverted V and started working the world. Well; bits of it.

The antenna farm covered many bands, Charlie's quick-connect multi-band inverted V, G0DZB's 3-pole horizontal 30 dipole, G1FOA's 4m beam and omni-vertical etc.

Many visitors and lots of fun, no doubt.

Peter, G1FOA says "4m up there."



Peter, G0DZB aligns himself with the true spirit & skips an elaborate pole worship ritual before sacrificing a sausage.

Pete, M0PSX gets out with his g/f pole and Slim Jim.



And finally - down to business.



## MFJ-926B remote ATU (and more besides)

I bought one of these after a long period of deliberation. My antennas have always been a little rudimentary and I wanted to put a long wire down the garden; I had the necessary pole(s) installed, but my next door neighbour had a large conifer that was growing across our garden just in front of the main pole and it was a perishing nuisance trying to get the wire up and unobstructed in such a way that I could keep it out of the tree and access it for cut-and-try.

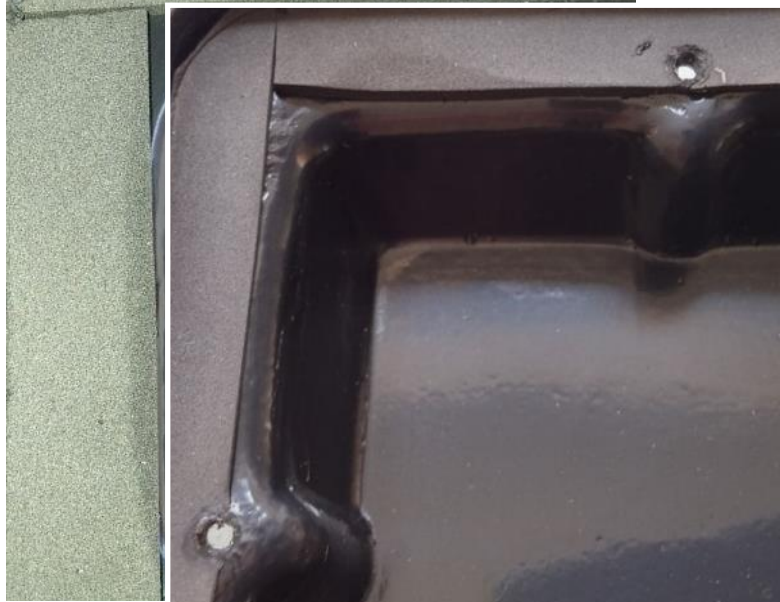
Recently, however, the neighbour had the tree cut down and I was able to get the long wire up properly and get going. At about 40m long, I had thought it should work OK on 80m, but I didn't want to use twin feeder as a doublet. Instead, I opted for a single wire feed at 1/3 of the way along the wire, Windom fashion. This was to connect to the remote ATU that was stationed about half-way down the garden.

A while back, I was helping John, G3WCO with a repair to his Icom AT-130 remote ATU and had an opportunity to study it in detail. It had suffered water ingress and had to be dismantled. Not Icom's fault; an insulator had not been connected properly and water had got in through that. (Not John's fault either, it was second hand). I told John I was considering an MFJ because it had a bias-T included and a 12V d.c. feed along the coax, so it didn't need any additional cables for power or to initialise a tune sequence. He advised me against it as he reckoned the Icom had a superior build quality, but I have a 35m cable run and was swayed by the convenience of the MFJ, in not having to drill yet another hole in the house wall.

So, I bought it eventually and after opening the box pretty much immediately regretted it. Even before opening it, the case is obviously flimsy and cheap and the connections looked none too sturdy. The case itself is blow moulded plastic (ABS?) and is very thin, so it is also very flexible. So flexible in fact, that just holding it firmly enough to support the weight of the box, the case distorts and then the air inside 'breathes' through the gaps around the connectors - none of which are sealed in any way.



Also, I was disturbed to find something rattling around inside the case. Not knowing what it was, I took the case lid off (there should be no warranty issues - you need to get inside the case to alter switch settings or reset anything).



Again, I was surprised and disappointed to find all the case screws barely finger tight and the water proofing gasket around the mating flange was not continuous - it did not surround all the screws. I reckoned this was a water problem waiting to happen, but convinced myself that there must be hundreds of these in use, so tried to ignore it.

I know there is an argument for leaving a drain hole to let out any water that might get in, and also an argument that a breathable case helps avoid condensation, but it is still disconcerting.

This tuner has no memory as it doesn't have latching relays, so if the power is off it will switch to straight-through mode. Looking at the position of the i/p and o/p connections, it

is fairly obvious that the signal does not have far to go at all across the board, so the straight through condition should not introduce much in the way of extra capacitance or inductance.

The build quality left a lot to be desired and I would have liked to have seen some better ground connections, but it is what it is, I guess.



The objects rattling round in the case turned out to be blobs of solder and were easy to remove but the next problem was about to raise its ugly head. The case lid has a lip on it that surrounds the mating flange joint and this projects into the space where all the bottom-mounted connectors are sited.

What this means is, once you have a PL259 connector attached to the coax input, the connector body butts up to the lid flange, thus leaving no room to protect against water ingress by wrapping self amalgamating tape around the connector.

Also, the earth connector which, annoyingly, has a 3/16" USAnian thread is too short, fiddly to get to in use and has a shockingly poor locking arrangement that comes loose inside at the slightest provocation. I partially fixed that by fitting a longer 5mm bolt and better lock washers, but the angled case means that the wing nut then clouds the mounting bracket...



My 10m vertical was first up for testing and I found a curious reluctance on behalf of the ATU to tune it on some bands. OK, as expected, 160m was a non-starter, but the other bands should have been OK.

With the ATU unpowered in straight-through mode, I measured the impedance at the input and recorded it across the entire amateur bands from 1.8-29.8MHz. Looking at the impedances involved, I wondered why it would not tune, as everything from 80m upward was theoretically within the range of impedances that the ATU should cover. After puzzling over this for a bit, I reconnected the coax and measured the impedance of the vertical between the ATU's ground and the antenna wire. The difference between the two measurements was due to the coax modifying the impedance of the antenna ground and becoming the dominant factor. A different ground was obviously needed, although I thought the one(s) I had would have been sufficient.

Now read on for the rest of the story—some of which is genuinely puzzling (to me, at least).

## High stakes & low chances — back to earth

Perhaps this item should have been entitled earth stakes and no chances, because I am about to relate my experiences with my main ground stake. For those who didn't read last month's newsletter item, this was 1.5m of 28mm copper tube I had hammered in under my remote ATU position.

Tony, G4YTG commented on that article and offered to loan me the tool he uses to put in ground rods. It is a piece of copper tube that you connect to a hose and, basically, use a water jet effect to displace the soil as you push it in. I had heard of this method before and seen a YouTube video, but it seemed a hell of a messy way to go about things, not to mention the waste of water. Tony, however, said it didn't use much and that the rod pretty much went in without any real effort. If you encounter a stone, the water sort of washes around it until it is displaced. Tony reckons he has had up to 4.5m of copper in the ground that way. Encouraged by this, I thought I would extract the rod I had hammered in, lengthen it and re-do it. It had been in place for a few weeks and I noticed when I pulled it out a) it was easy, and b) very little of the rod had been in contact with the soil. This could explain the fact that it didn't really seem to improve much on my previous arrangement and the pic below is typical of the whole of the earth tube.



Reason notwithstanding, I started with a 15mm copper tube and made up a hose coupling and tap to control the water flow. I had about 2.7m of pipe available so I thought I would use that as a pilot hole and see how far I got. I started the water flowing and, sure enough, it slipped down remarkably easily at first and, after encountering some minor obstructions and jiggling it about a bit, it went down about as far as the original pipe had done. Then it stopped. We've been here before. The pipe wasn't strong enough to withstand any vigorous bashing into the ground, so I pulled it out and changed it for the 28mm piece which was now doubled in length to 3m. Picture, right, of the tap arrangement at the top.

This was even worse. There seems to be gravel several feet down that extends across the garden, because I have dug through a similar layer when I had to excavate a serious amount of soil several years ago. The problem is that when you encounter this, it becomes pretty free draining and, with the larger diameter tube, the effect of the water jet seems diminished. Also, the water coming back out of the hole starts to appear perfectly clear, thus indicating it is no longer washing any soil away and probably removing any that might have been in contact with the pipe to start with. I also tried using a length of similar sized, but thicker and stronger aluminium tube to hammer and bash the rocks away, but no.

I recently found this method on the 'net for putting in ground rods (I paraphrase):

*You start by scooping out a small recess about the size of a drinks can where the ground rod is to be placed, then fill this hole with water. In my case, the water would probably disappear straight away, as the topsoil is quite porous. Anyway: next...*





*Insert the ground rod into the centre of the hole. Work the ground rod up and down, gently. After a while there will be a noticeable hole into which the rod will sink. Pull the ground rod out of the hole completely each time and let the hole fill up again with water. After a while, more water will need to be added to the hole (hmm... see note above). Small pebbles should be no problem. The last stroke should drive the ground rod below the level of the earth, which is where it needs to be, completely underground. When the hole is dry again, clamp the ground wire or strap to the top of the rod, cover the connection with grease, cover that with an aluminium can for protection and bury it. A bit of salt in the water will improve the ground's usefulness; also, ground up charcoal is good for that.*

OK. I can understand that, and it may be a better method as the soil slurry generated by the process may well remain in contact with the rod. There is plenty of evidence on the 'net to suggest it is a tried and tested method, but my soil wouldn't allow it to work as it is too free draining. Indeed, I tried to use a hose to keep adding water, to no avail. It would probably be good in suitable ground, but the evidence I have seen of the amount of gravel in my sub-soil suggests that a water lubricated gravity method would not be very successful in getting past the stony layer. (PCs have the concept of RAID drives (Redundant Array of In-expensive Disks?) but I think I have a Redundant Array of Idle Dipsticks...) So; I couldn't hammer the pipe in or hose it in either - the pipe that was hammered in wasn't really in contact with the soil and the ease with which the pipe can be withdrawn using either method suggests that neither is going to be really effective in the long term.

A decent length of solid rod and bigger hammer may help, but I already had several copper plated steel ground rods - some new, some used for a while, but they are quite short (and I also wonder about their long term effectiveness). My Screwfix ground rods are only 4' long and 3/8" dia. so are not that difficult to drive in anyway. I noted after I removed them from a previous location that the wear on the copper coating associated with the process of hammering them in might lead to poor performance long term. They do some extendable earth rods that are also 4' long, 5/8" in diameter and can be joined with a suitable coupler to 8' in total. Anyway, I put the three available rods into the ground close to where I had sited the aborted copper tube about 30cm apart in a line, using a combination of methods with and without water.

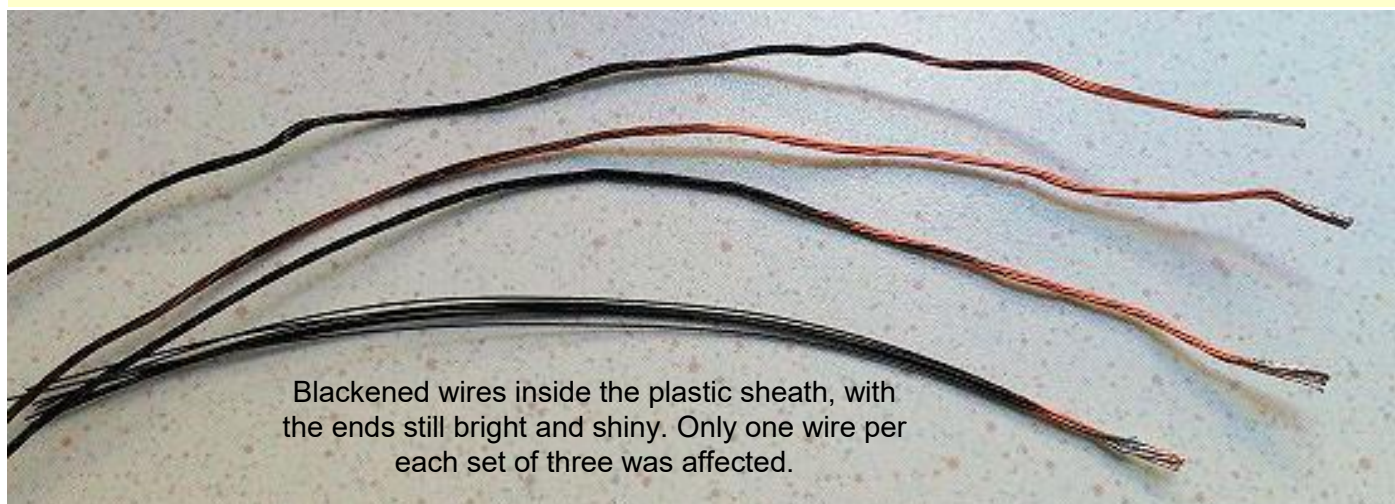


I needed to make up some leads to connect these in parallel with the existing ATU ground. I already had some, kept back from when I installed the rods previously but they were too long, so I cut them approximately in half. These leads were made up from three twisted lengths of 1.5mm<sup>2</sup> mains earth wire. When I made them up for the original ground rod situation, I was careful to make them evenly twisted and as equal in length as possible in each set. There was no electrical reason for this in mind - I just wanted to make sure they didn't look unsightly as they were in a prominent position.

When I cut them and stripped them back to fit the new 8mm ring terminals, I found that one of the three wires was as black as the ace of spades—just like the blackening you get on the braid of a coax in a high SWR environment. Curiously, the blackening was only *inside* the jacket and *didn't extend to the exposed ends of the wires*. This was still bright and shiny. Even more curiously, there were three sets of leads, each of different lengths and all were similarly affected; only one of the strands per set being blackened,

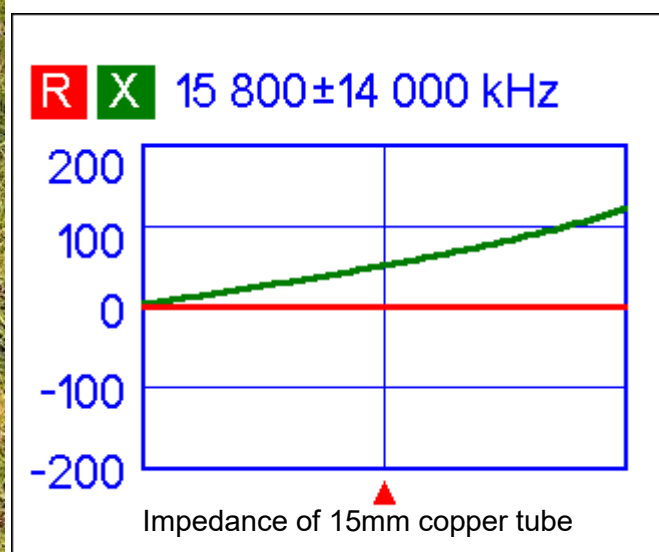
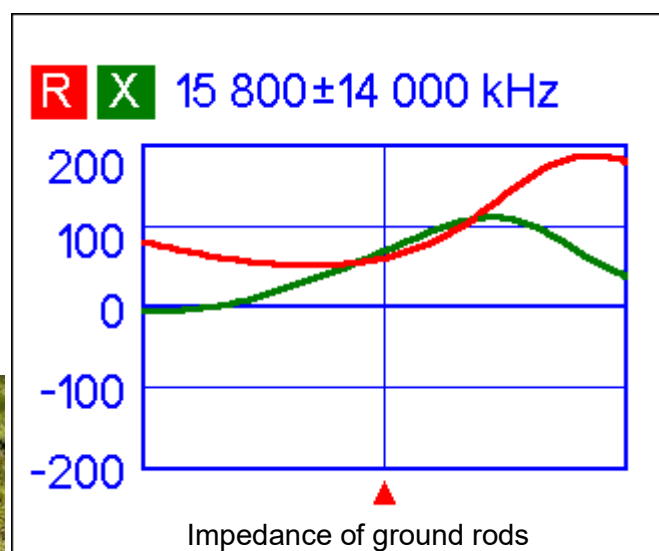
the other pair being completely unaffected. The wire was off the same reel when I made them up. The blackening leaves a shiny surface to the copper—almost as though it has been black anodised. It doesn't come off on your fingers and there is none of the normal signs of corrosion or water ingress at the cable ends. It's really strange and I don't understand the mechanism at all.

Could it be that only one of the wires was carrying all the current and that high voltages or currents existed when they were in service that somehow caused this? Who knows. At the moment, I shall have to dismiss it as a curiosity. A picture is offered on the next page. I replaced all the wire and checked for signal integrity. Next, I thought I would measure the impedance of the ground rods.



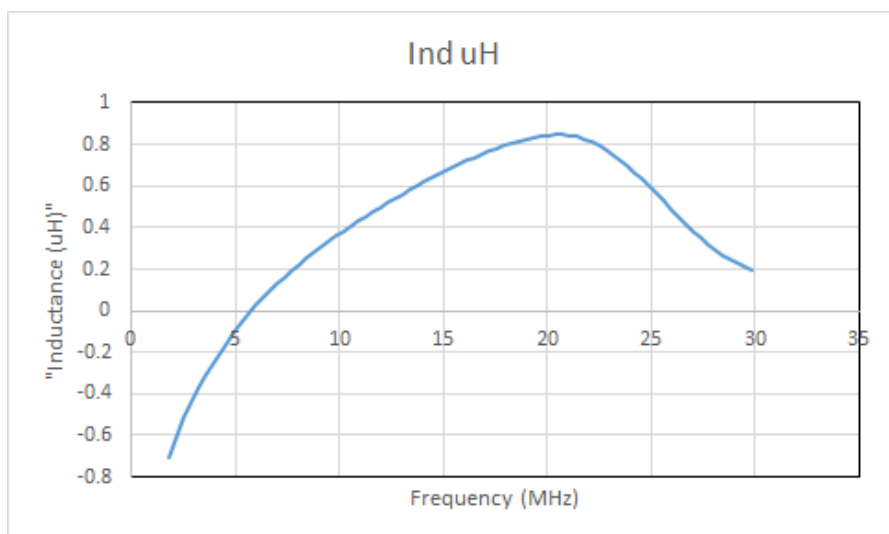
If you have a single ground, the only way to check the integrity is probably by equivalence. Connect a known antenna and then measure the impedance and change the grounding arrangements. Any change in impedance measurements will tell you if you have got an improvement or a disappointment.

In this case, I had the three rods so I measured the impedance between them in pairs. I didn't know what to expect, but this is what I found: The graph (right) represents impedance between any two rods. The resistance is reasonably low, but not really what you might expect. The ideal would be zero ohms and inductance. I wondered what a good solid short between the test leads would be. I put a piece of 15mm copper pipe between them and re-measured. This equates to about 2 ohms and 650nH max.





Using the rule of thumb that inductance is 20nH/inch, I would have expected about 500nH in the leads so it about stacks up, I guess. The equivalent inductance of the ground impedance + leads, calculated from



the reactance, is approx. 850nH at 21MHz. The reactance is negative below 6MHz, which denotes a net capacitance. If the impedance between any two rods is (say) 150 ohms at 21MHz, then will the impedance will be half of that per rod? If so, will the impedance of the three in parallel be  $(150/2)/3=25$ ? The lowest impedance I measured was 60 ohms at about 7MHz. Could I hope for an impedance of 10 ohms? Whatever, it seems good enough to do the job, as I am getting some good reports on the Windom.

Next up, I wanted to use the ATU on a Saturday evening for NFD and found the ATU wouldn't tune. No matter what frequency I chose, it flatly refused to tune. A dummy load in place of the ATU showed there wasn't a problem with the cable or d.c. feed, so I went to take the ATU off the wall and find out what the problem was. There, I found one of the ground rod cable clamp bolts had sheared and the two halves were laying there by the clamp. I guess the brass bolts aren't too strong. I could expect them to shear if you overtightened them, but not after the event, and at a time of their choosing. Strange, again, but easy to replace the bolt. So; what was up with the ATU? I feared that water had got in after the horrendous rain we had recently but, when I opened the box, it was quite dry. My fears about the seal proved to be unfounded, at least.



The ATU has a row of switches. On the right (below) is the white power switch. The other two control the tuning and either set it to manual tune, force tune or auto tune in various combinations. I tried the tune buttons but they didn't respond and finally, in desperation, toggled the power switch. Hey presto, the relays instantly clicked and it worked. I have had the top off the box twice, but never touched those buttons. What's more, the ATU was working as well as can be expected for some while before it failed.



Quite how that switch had managed to switch itself off, I don't know. Maybe it had a dry joint or got a bit of dirt in it. If it happens again, I'll have to have the board out and check everything. Maybe that's where the solder blobs came from...

My last observation on this ATU? The case is way bigger than necessary for the electronics and the switch board pictured above is mounted remote from the main RF board on a ribbon cable about 3" long. When I first opened the box, I suspected this was to keep it away from the RF. My suspicions were deepened when I tuned up one day on low power and all seemed OK. I increased the power to a nominal 100W and then the ATU and/or SWR started to 'hunt', or oscillate, but stabilised again when the power was reduced to 80W. I hope it doesn't do that too often! OK, I'll admit it works more often than it doesn't but I still have my reservations about the quality, and the design drop-offs could be fixed for little or no extra cost. It's a pity that MFJ didn't see fit to do so.

**Ed.**

## Chinglish?

I was browsing eBay recently and came across this : [PIC-Version-8W-Super-RM-RockMite-QRP-CW-Transceiver](#)

A Rock-Mite transceiver; nothing special, apart from the price, £13.99, and anyone else's grasp of a foreign language has to be better than mine, but I loved the description...

*"Super octopus" (Super RM) originally by the SWL laboratory in 02, formerly known as "Rock Mite", has been popular in the United States, is a representative of the repeater receiver!*

### Main indicators

Power supply: 12 V to 13.8 V (linear regulated power supply) is recommended for the

Receiving antenna: 50 ohms, unbalanced type static current: 25 ma

Transmission power: 4 w (using the 12 v power supply, launch will be slightly down for a long time)

Frequency: launch the vibration frequency, 7023 KHZ; Receive this frequency: about 7023-7026 KHZ

Working pattern: the CW

### Automatic/manual keys

This circuit has the function of automatic identification of automatic and manual keys, opened the power PIC12F629 SCM according to the inserted key for automatic detection. Note: the manual key mode does not support input, automatic call and configuration.

### Automatic call

Short press the SW button immediately let go, then the machine automatically call **"CQ CQ CQ DE a wailing cry cry PSE K"** again.

### Code speed control

Presses the button, SW about 3 seconds after the headphones to hear "clicking" sound, for the first time at this time of SW key, and after hearing "di di" prompt, key 3 seconds will automatically dial dial into "row" code speed to speed up, slowed down or dial to "points" code. Hear "di di" after the prompt, can continue to touch point to the appropriate speed, the suitable not button, after waiting for about 3 seconds, hear "di di di" end configuration.

### Frequency regulation

Presses the button, SW about 3 seconds after hearing "click clicking" function for the first time, don't let go of SW key at this time, to hear the second after 3 seconds then "clicking", release the SW key at this time. After hearing "di di" prompt, 3 seconds to set the automatic key piece of dial to "draw" frequency increases, or to reduce the frequency of "points". Hear "di di" after the prompt, can continue to touch point to the appropriate speed, the suitable not button, after waiting for about 3 seconds, hear "di di di" end configuration.

### Callsign input

SW button is pressed and hold for about 3 seconds after hearing the first "Da Dada" feature sound, then do not release SW key, another three seconds after hearing the second "Da Dada" at this time still release the SW button, another three seconds after hearing the third "Da Dada", then release the button to enter the callsign SW configuration mode.

### Callsign entered in this way:

Wait for the tone "Didi", according to the first character callsign Morse code first is a point or draw, pulling the key corresponding point or draw. After hearing the second "Didi" beep, and then struck the first character of the second point or draw, turn losers after the first character point plan, will continue to hear the "beep" tone In this case do not enter dashed. Over 3 seconds, it will hear "beep" tone again, then you can enter the first point of the second character program.

Configuration write MCU internal EEPROM because it takes time, to avoid misuse configuration. If a configuration error, you can re-enter the configuration according to the process.

- Ed.



## The G4GHO VNWA3 S-Parameter Test Set

I have long harboured a desire to own a vector network analyser (VNA) and last year I answered an advert in RadCom to a guy who had one for sale. I said I would call him later in the day after I finished a task. I missed a text from him an hour or so later and when I got back to him I found he had sold it to someone else. After regretting missing the chance, I ordered an SDR-Kits VNWA3, on the basis that I would probably soon forget the cost but my frustration in not owning one would persist. The unit has been well reviewed in the amateur press but, briefly, it offers the following functions:

- Vector network analyser (S-parameters: frequency, phase and amplitude response) to 1300MHz
- Network matching tool
- Time domain & distance-to-fault measurement
- Spectrum analyser to about 100MHz
- Frequency counter
- CW, AM & FM signal generator
- Component measurement: resistance, admittance, capacitance, inductance & Q
- Antenna radiation pattern measurement (but only with suitable external equipment)

Having received the VNWA3 (lower item in picture), I was delighted by the quality of and amount of information that was available for the unit. My main aim was to use it for normal impedance or transmission (frequency response) measurements. It will perform reverse isolation measurements too, but to do that you have to reverse the test piece on the connecting leads. It soon became apparent, however, that I would regret having to repeat the tiresome disconnection and re-connection of the device under test (DUT) in those circumstances where a full 2-port analysis was required. I really wanted a matching test set that would eliminate that need with the resultant connector wear and potential unreliability.

The S-parameter test set is essentially an external transfer switch that alternates between forward & reverse switching and, as a bonus, can be made to do so automatically under software control from the VNWA itself. Unfortunately, transfer switches are precision instruments and tend to be prohibitively expensive unless you get hold of one on the second-hand market.

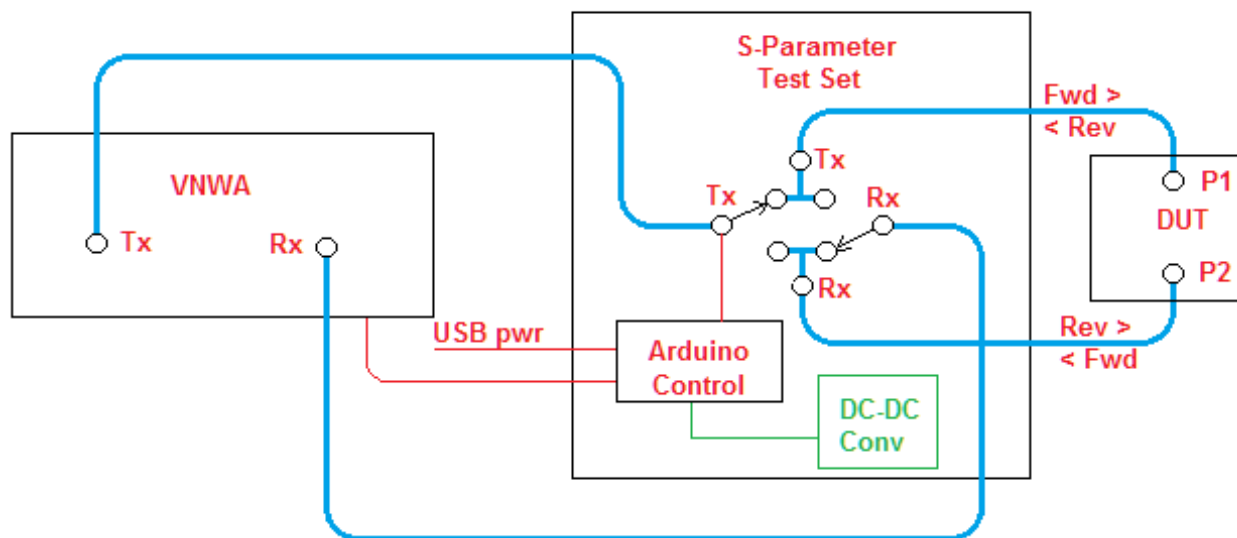
Jan Verduyn of SDR-Kits showed me how others have made their own and after I had identified components that I could source on eBay, I persuaded myself I could get the parts inside a VNWA housing. Jan agreed to supply me with a kit of case parts and some old labels to add to the following parts list:

- eBay - Radiall R566463239 28V latching transfer switch (in fact I bought a spare)
- eBay - XL6009 DC-DC converter & Arduino Nano V3.0
- CPC - RJ12 leads, sockets and plugs for interconnection, trial and inevitable errors
- Maplin - USB A adaptor plugs to eliminate signals from PC USB sockets
- Mini-Circuits SMA rt. angle leads, connector savers & rt. angle connectors
- CPC - Amphenol right angle adaptors & straight Jack-Jack male couplers.

I then had a kit of all the parts I needed and a rather loose plan as to how I was going to shoehorn it all into the box. This was going to be interesting.



## G4GHO S-Parameter Test Set general schematic



I had decided to control it with an Arduino Nano (right, in the picture) after being encouraged by Alan Hanna, M0IWZ. With the help of Charlie, M0PZT I took my first faltering steps into Arduino programming. Thanks Charlie! The relay needed 28V to operate, but I had no control data for it and no idea of the signals required. Radiall could not help as the switch was long obsolete, so I dismantled it to work out the modus operandi. With discrete devices inside, it seemed TTL signals would do it and tests proved that to be the case.

I didn't fancy a 28V outrigger bench supply, so I used an XL6009 dc-dc converter to do the job (the board with the arrow). The converter is rated to provide 28V from as little as 3.3V, but it took almost 500mA from the 5V supply for about 30mS as the relay switched.



The VNWA actually has a switched 5V output and I had initially hoped to be able to use that, but the required converter current was more than the VNWA output was rated for. I didn't have access to the VNWA internal circuit and didn't really want to hack the VNWA blind to put in a soft switch with greater capacity, so I went for a separate USB supply to the test set; for example, a standard 5V USB phone charger.

The dc-dc converter current could easily be supplied by the standard USB output on most PCs, but I wanted to have a bit in hand to reduce the risk of the USB voltage dropping either excessively, or at all. As some PC external hard drives need a bit of oomph, it is possible to buy USB leads with a piggyback cable that carries only the d.c. power pins in parallel with the main USB lead that carries power and signal.

Now; I wanted the flexibility to alter the software without removing the Nano and I didn't want to add any more USB connectors in the test set, so the 5V that powers the test set dc-dc converter is routed via the Arduino Nano's USB connector, which also powers the Nano itself. The downside is that if I connect a standard USB PC lead, the Nano is picked up by the USB bus and the PC will "see" it. No real problem, but I wanted to avoid that in VNWA mode, as the Nano has its own way of responding to the PC.

I got round it by making up a dummy USB M-F connector (with only the power pins connected) that I could fit in series with the PC USB lead. As the piggyback lead carries only power, that could just be plugged into the PC directly.





Of course, none of this palaver is necessary if you use a 'phone charger and, in the event, it turned out that the piggyback lead was unnecessary so a standard lead with the signal block adapter worked just fine.

Like other S-parameter test sets, this one does little more than respond to control signals and switch the fwd/rev paths, but I did give some thought to signal integrity & routing, aesthetics and ergonomics. The switch direction is selectable under software control and the layout of the switch and internal cables has been arranged so that the test set is a reciprocal device and can be connected in one of two ways: either face-face to keep the lengths of the interconnections and losses to a minimum, or on top of the VNWA to allow access to the connections in a more conventional manner for less critical applications.

I was using a case that was designed originally for the VNWA and the instrument labels relate to an older version so are not directly relevant to the test set, but at least it gave the appearance that it belonged. Unfortunately, there were still holes in the case that were occupied by the original USB connector and power indicators.

I solved that problem by adding some BITE (built in test equipment) indicator LEDs to indicate direction of measurement (fwd/rev), sweep activity and correct Nano operation. Upon applying USB power, the test set sends an optical 'K' at the 'on' LED, then cycles the relays giving both audible click and visual feedback. The fwd/rev LEDs are routed via the internal switch contacts that are slaved to the RF switches. The power to those comes from the VNWA's internal +5V supply so that indicates all signals are present, correct and in the right sense.



## Conclusion?

No. Nothing like it. There is so much more to this, but it is probably not appropriate to carry on here. I am very pleased with the results and it's nice to have something that I hope will be both useful and reliable. Final cost? I don't really want to think about it, but I could probably justify it.

I spend a lot more time on the bench than on the air and I don't really hanker after expensive rigs, so I may as well spend money on test gear that I will appreciate and, in the short time I have had the finished article, it has already proved invaluable. I am looking forward to using it to investigate much of my equipment.

I wanted something that looked smart as well as functioned. Also, buying matched cables and connectors I could trust made sense; some of those cheap Chinese SMA connectors are total cr@p and can do real harm to the VNWA ports. The electronics are compact, cheap and readily replaceable and I hedged my bets by buying two used switches at a very reasonable cost, so the most vulnerable (and possibly irreplaceable) part stands a chance of replacement should it ever become necessary.



Let's hope it doesn't! **Ed.**

## Intermediate Exam passes

Yet again, CARS has been responsible for a 100% success rate in the latest Intermediate Exam passes. The happy candidates will probably have applied for their new calls by the time you receive this and, no doubt, be looking forward to the next stage and the Full licence qualification.

It reminds me of an occasion when I was teaching the RAE in the early 80's in Crawley. My brother Dominic, who finally managed to get the call M0GUZ a few years back was on the course and being his usual self—the clown of the class. At the end of one lesson I had asked if there were any questions. My brother leaned back in his chair and said “Yes—I have one. Did you know your flies are open?”

Ed.



## Mild amusement

I was reading the summer issue of CAMRA's "Beer" magazine wherein they were discussing the history of mild ale. Apparently, the term refers not to the gravity or hoppiness of the beer, but the maturation length: stale, or aged beer and mild, or unaged. Be that as it may, the article then went on to refer to the gradual weakening of beer which was due, in part, to Government regulations and in July 1917 Punch ran this amongst a series of jokes about them: *"A Pittsburg inventor is reported by Mr MARCONI to have discovered a method of bottling light. If he can bottle anything lighter than the new Government ale, then his claim to be a wizard is well established"* (their capitals). I assumed this referred to some kind of news service, so I Googled Marconi News. Sure enough, up came Marconi Service News Volume 2 for 1917. It was a lovely diversion and almost answered a question for me: the transmission speed of the early operators. Not saying precisely what the message content was and, bearing in mind that these were hand transcribed and forwarded with a possible average content of 20 words, that gives a very respectable 15-20 wpm. I can't even transcribe at 20wpm, never mind fill in the form headers etc. (and probably explains the bad writing!)

Maintenance hints included *"Please be definite. When ordering fuses, state number, type and size(!). If you have any doubts, we will help you out. If your Bradfield deck insulator leaks, tell us whether it is an electrical leak or whether water comes through. In the first case, a new hard rubber insulator is needed, and in the second a can of white lead."*

Priceless!

Ed.

Operator "Paddy" Walsh of Honolulu recently sent to the Marconi receiving station in California, a distance of 2,372 miles, sixty-seven messages in one hour and twenty minutes. None of the messages was shorter than fifteen words and some of them contained forty words. W. H. Barsby, operator at the receiving station, copied the messages without a "break" or an error.

Operators in the Marconi office in the heart of the business section of Honolulu are today with the aid of repeaters transmitting direct to both the United States and Japan. Automatic transmission and reception of messages at a speed of from eighty to 100 words a minute will be brought into use in the near future.

W. A. Winterbottom, the new Division Superintendent, believes the 100-word a minute estimate is entirely too conservative; half again that speed can be obtained, he predicts.

Meanwhile, some wonderful performances at the key are being carried out. "I spent Thanksgiving eve and day with the boys at Marshall," says Mr. Winterbottom, "and witnessed Mr. Walsh, in Honolulu transmit fifty-seven Night Lettergrams direct to Mr. Barsby, without a break and without a correction, in fifty-nine minutes."



## Radio Caroline amateur radio station

The Essex-based Martello Tower Group will be operating special event station GB5RC from the MV Ross Revenge, home of Radio Caroline, to commemorate five decades of offshore radio broadcasting.

Operation is expected to occur from August 5-8. The group will set up two stations actually on the world famous Ross Revenge which is located on a fixed mooring in the River Blackwater in Essex.

Verticals for 40m, 20m (adjustable for 17m), 15m (adjustable for 12m) and 10m will be set-up on the stern of the ship. The two stations will operate simultaneously with full UK legal output power and a special QSL card will be available.

Radio amateurs were instrumental in keeping Radio Caroline on the air in the 1960's and 1970's. Among them was Chelmsford Amateur Radio Society member Carl Thomson G3PEM who was Chief Radio Engineer on both Radio Caroline North and Radio Caroline South in the mid 1960's.

QRZ Entry [qrz.com/db/GB5RC](http://qrz.com/db/GB5RC)

Martello Tower Group [martellotowergroup.com/](http://martellotowergroup.com/)



MV Ross Revenge at sunset

## ECWARC NFD

I went along to show willing at the start of ECWARC's NFD this year. I was doing other things that weekend, but I did at least get to remind myself of the days of yore when we all used to run to various hills in Sussex for Crawley ARC's efforts. There aren't too many hills to chose from in Essex though, are there?

They had been there since about 9 a.m. and when I arrived about an hour or so before the kick-off, they couldn't get the ATU to tune. Rob, M0KCP had been dispatched to get a backup ATU whilst Andy struggled on. There didn't seem to be anything wrong. After all. An ATU is just an ATU, right?

Eventually, Dean, G4WQI spotted that it needed a 12V supply and then all seemed right with the world. Phew!

**Ed.**





## Skills Night

The June Skills meeting was a mix of the old and new, with Dave, G4HUP attending with his range of kits designed for amateur use as well as general purpose. His well stocked and laid out table was visited by all and he was kept busy answering questions.

Alan, M0IWZ brought along his anemometer and wind vane that he has been building recently. Based upon an



Arduino and a couple of stepper motors, the dials looked quite smart. They were made from a couple of CDs that Alan had printed and the indicator needles were made from pipe cleaners. My eyesight isn't all that bad, but even when it was pointed out, they still looked pretty good.

Ray just seemed to like fiddling with his weathercock.

Steve, M0SHQ brought along his ever popular satellite receiving kit and Chris, G0IPU sat and built a short wave crystal set. Tea and biscuits were as welcome as ever and those who stayed home to watch the footie missed both those, and a good quiz.. **Ed**.

